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### **Portuguese olive oil and the price of regional products: does designation of origin really matters?**

#### **Abstract**

Resources (tangible and intangible) can be mobilised to increase region's reputation and confer a competitive advantage to certain products with origin in that region. The returns of a region's resources depend upon the ability of local firms to appropriate the rents earned and whether the consumers value the characteristics of the region that are associated with the product, being disposed to pay a price premium. The results we got through the estimation of a hedonic price function, which relates the price of portuguese regional olive oil to its various attributes, provided empirical support to this idea. The study shows that designation of origin, producer's brand and olive oil characteristics (biological and mixed with herbs) have strong impact on price. Specifically, olive oil from regions of “Trás-os-Montes e Alto Douro”, “Beiras e Ribatejo” and “Alentejo” are expected to have price premiums relative to other olive oil without region indication (base category). It also allows to conclude that olive oil acidity has a negative impact on price.

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## Introduction

In a work dated from 1979, following CASTELLS (1972), SIMÕES LOPES (1979, p. 23) refers that space has nothing to do with “a blank sheet on the one individual actors and institutions develop their actions”. This same idea of no neutrality of the space was stressed during the eighties and nineties by several authors in such a way that we can say that suggesting that space is neutral has become old-fashioned.

Addressing this issue, RATTI (1995, p. 6) proposes the concept of "active space" as being the "outcome of a field of forces where the level of output depends on the capacity to produce a mix of cohesion, innovation and of strategic behaviours in a systemic-evolutionary context". MAILLAT (1998, p. 3) claims that “territories no longer appear as passive locations for receiving companies (generally branches/subsidiaries of large companies), owing to certain given, pre-existing location characteristics, but as active territorial organisations capable of creating specific (as opposed to generic) and differentiated resources“. To DELAPLACE (1995, p. 4) the team of actors with whom the company maintains a demand (customers, competitors), productive (suppliers) institutional or cultural (political, social and cultural institutions) relationship, constitutes what she calls a "space-relational horizon". CREVOISIER (1995, p. 5) defends a notion of territory that includes the physical dimension of the space, and, at the same time, a "framework to explain the socio-economic interactions". Similar or complementary views can be found in authors like AYDALOT (1986), LUNDVALL (1988), CAMAGNI (1991), GAFFARD (1992), BATHELT (2001) and many others.

These various notions of territory not only include the space, but also the resources and capabilities which give a competitive advantage to the products with origin in a certain region. The returns of a region's resources depend upon the ability of local firms to appropriate the rents earned and whether consumers value the characteristics of the region that are associated with the product, and are willing to pay a price premium.

The motivation for conducting this research is threefold. First, to enhance our understanding of the impact of territory information on buyer behaviour. Specifically, the extent to which territory information (designation of origin) affects olive oil prices given other cues. Second, to measure the implicit value of the most important olive oil attributes through the estimation of a hedonic price function, which relates the price of a product to its different attributes. Third, to provide empirical evidence that might be useful for producers' long-term investment decisions, for the support of local development strategies and for the design of competitive courses of action.

Section 1 of this paper describes the different types of resources and capabilities that can be found in a region and, on the other hand, explains how these assets can increase the value of regional products. In section 2 we present empirical evidence that suggests that buyers might respond to territory cues by paying more for goods produced in specific regions. In section 3 we present the hypotheses underlying the study. In section 4 we refer to the research methodology. In section 5, based on experimental research, we investigate the effects of the region of origin and other attributes on the portuguese olive oil prices set by a retailer chain (Pingo Doce) in a competitive market. Finally, we discuss our findings and describe the policy implications that can be drawn from the study.

### 1. Regional products and local development

Resources are inputs into the economic activity of a territory. But, on their own, few public or private resources are productive. Economic activity requires the cooperation and coordination of sets of resources. For instance, the cultural goods production are configured by the conjunction of financial, physical, human, institutional, technological and reputation resources, which define the concrete reality of each specific territory.

**Table I – Region's resources and capabilities**

<b>Resources</b>	
<b>Type</b>	<b>Examples</b>
Financial	Region's borrowing capacity, local and regional taxes, subsidies, state financial transfers
Physical	Climate, ecology, land, infrastructures, hospitals, schools
Human	Local politicians, business leaders, entrepreneurial capacity, work force skills and practices, cost of labour
Institutional	Local administration, central government agencies, chambers of commerce, business associations, banks
Cultural	Historical identity, architectural heritage, traditions, gastronomy
Technological	Resources for innovation, universities, research units, scientific parks
<b>Capabilities</b>	
<b>Type</b>	<b>Examples</b>
Ability to mix resources/assets (financial, physical, human, institutional, cultural, technological)	Region's reputation and image (domestic and international) Favourable industrial atmosphere Competence in research and innovation

Source: Adapted from GRANT (1991); KANTER (1995); FREITAS SANTOS (1997).

Some regions, however, can be well endowed with resources but poor in capabilities. A capability is the ability for a set of resources to perform some tasks or activities at the highest standards. For example, the improvement of the region's image and reputation depend on the ability of local administration to manage the region's resources, the interest of business leaders (domestic and foreign) to establish networks (social, organisational) and of the efforts of several others stakeholders to promote the region.

Resources are the source of a territory's capabilities, while capabilities are the main source of competitive advantage of the territory (GRANT, 1991; KANTER, 1995; FREITAS SANTOS, 1997).

Some resources are easy to identify and to evaluate, such as financial resources and physical assets. Others are less visible and difficult to appraise, like human capital (people's skills, knowledge, reasoning and decision-making abilities) or reputation (GRANT, 1991; FREITAS SANTOS, 1997).

In brief, as pointed out in the first paragraphs of the paper, regions are not mere geographical (empty) spaces. They are endowed with resources and capabilities in varying amounts and value. As a result, territories generate specific capabilities that can be mobilised to qualify region's products. Regional products seem to be a paradigmatic case: i) they are based upon a geographic specificity in the production process and/or in the raw agricultural inputs; ii) they must have historical background (existence of the product in the past, with characteristics similar to the present); and iii) they must have cultural value that can be easily associated with particular celebrations or to local gastronomic customs (SODANO, 2001).

Given this, we can expect producers (farmers, artisans, entrepreneurs, distributors) to use the territorial references to increase the value of their products and sustain differentiation towards their competitors (SALOLAINEN, 1993; KUZNESOF *et al.*, 1997; HENCHION and MCINTYRE, 2000; DINIS, 2000; BIANCHI, 2001; BLUNDEL, 2002).

Therefore, regional products require, on the demand side, social recognition of its usefulness and reputation and, on the supply side, a local collective dynamic of appropriation that qualifies the product, be for the preservation of an intrinsic characteristic (taste, texture, colour, form) or extrinsic (brand name, manufacturer name, region of origin, reputation) [LOCKSHIN and RHODUS, 1993; JENNINGS and WOOD, 1994; GIL and SANCHEZ, 1997; ANGULO *et al.*, 2000].

The returns of a region's resources and capabilities depend upon the sustainability of the competitive advantage and the ability of local firms to appropriate the rents earned. The competitive

advantage that benefits products with origin in a specific territory is considered to be a rent, which corresponds to the internalisation, on the part of local producers, of a group of external effects embedded in the territory. However, this rent is only reached when the producer is willing to reflect the effects of a product's region of origin in the price and when the consumer values those characteristics of the region that are associated with the product, being disposed to pay a price premium (LOCKSHIN and RHODUS, 1993; HULLAND, TODIÑO and LECRAW, 1996; BIANCHI, 2001; SKURAS and VAKROU, 2002).

Research questions on region of origin effects are important, particularly in the context of rural communities and less industrialised regions, since information on region of origin in certain products seems to lead to higher consumer preferences and a more positive attitude towards goods produced in such regions. Research into region of origin effects also has significant implications for the decisions made by, both, business managers and policymakers.

## **2. Designation of origin, price and the hedonic approach**

Researchers from international marketing have long made clear that country of origin has a considerable influence on the evaluation of a product (BILKEY and NES, 1982; SAMIEE, 1994; ELLIOTT and CAMERON, 1994). Approaches from other scientific areas have focused on the effect of region of origin information on the market valorisation of regional products, specially wine (GIL and SANCHEZ, 1997; ANGULO *et al.*, 2000; SKURAS and VAKROU, 2002; SCHAMEL, 2003; CADIMA RIBEIRO and FREITAS SANTOS, 2003). However, research regarding the importance of designation of origin on the price of olive oil is scarce.

The study of region of origin effects seeks to understand how consumers perceive products emanating from a particular region. From an information theoretical perspective, products may be conceived as consisting of an array of information cues. Each cue provides customers with a basis for evaluating the product. The study of informational cues has generated research on the impact of multiple attributes on product's price, such as brand (VRANESEVIC and STANCEC, 2003), region of origin and label (ANGULO *et al.*, 2000; STEINER, 2002; SKURAS and VAKROU, 2002), quality signals and regional reputation (SCHAMEL, 2003; CADIMA RIBEIRO and FREITAS SANTOS, 2003) and design (JENNINGS and WOOD, 1994; KAWAMURA, 1999). The informational cue that merits our particular interest here is the designation of origin of a product, as regulated by the European Union legislation (Reg. 2081/92).

The present study examines the relationship between the region of origin information and price, but from a seller's, rather than a buyer's, perspective. Surveys and experimental research on price preferences have indicated that, potentially, buyers might respond to territory cues by paying

premiums for, or expecting discounts on, goods produced in different regions. Thus, if we assume a competitive market situation, price should ultimately reflect territory effects if and only if territory information has real value for consumers. In a highly competitive market, where many competitors exist and price information is readily available, sellers (retailers) will be able to charge price differentials only if they have found that consumers are willing to pay for them. Therefore, by examining seller's pricing behaviours in a competitive market, we can infer the likely effects of territory information on buyer behaviour. Market prices reflect present consumer buying behaviours, providing a clearer view of how consumers ultimately respond to territory information and other information sources (HULLAND, TODIÑO, LECRAW, 1996).

Also addressed in this research is the extent to which territory information affects product pricing, given other cues that could also influence prices. In this case, region of origin information has not been artificially highlighted, and so its relative importance versus other information sources (olive oil characteristics) can be assessed.

To determine the implicit value of olive oil we estimate a hedonic price function. This approach has been used in economics to study the influence of agricultural and food products characteristics on price (STANLEY and TSCHIRHART, 1991; NERLOVE, 1995; OCZKOWSKI, 1994; COMBRIS *et al.*, 1997; ANDULO *et al.*, 2000; CADIMA RIBEIRO and FREITAS SANTOS, 2003). Hedonic price function captures the relationship between the observed price and the amount of each characteristic contained in the product, and generally is defined as:

$$P = f(x_1, x_2, \dots, x_k) \quad (1)$$

where  $P$  is the observed price and  $x_1, x_2, \dots, x_k$  are the amount of the characteristics of the good.

The partial differential of the hedonic price function (1), that is  $dP/dx_i$ , shows the shadow price of the characteristic  $x_i$ . This differential represents consumers' preference and we can make use of the information obtained from the hedonic price to evaluate the impact of designation of origin on price. We can also use additional independent variables as shifters in equation (1) in order to capture other factors affecting the price (KAWAMURA, 1999; SCHAMEL, 2003). In this research, factors are categorised into three groups: characteristics of the olive oil, brand and designation of origin. Therefore the hedonic price function is:

$$P = f[x(x_1, x_2), y(y_1), z(z_1)] \quad (2)$$

The first category of independent variables contains two sub-categories:  $x_1$  is the type of olive oil (virgin, biological or with plants) and  $x_2$  is the degree of acidity. The second category ( $y_1$ ) captures the effects of brand and the third the effects of designation of origin on price.

Equation (2) has been estimated for portuguese olive oil prices. As price data is a quantitative variable we used ordinary least squares (OLS) to estimate the hedonic price equation.

### 3. Hypotheses

A review of empirical evidence uncovered a wide variety of factors that might influence the extent to which an effect of region of origin can be observed in the price of a particular product. Factors relevant to the current study include the designation of origin, product characteristics and brand. The effect of each of these factors on the price premiums set by retailers in a competitive market is investigated.

**Hypothesis 1 – The price of olive will decrease as the degree of acidity increases.**

From what is common known, it would be reasonable to expect an inverse relationship between the price of olive oil and the level of acidity, because consumers often associated low levels of acidity in olive oil with higher quality and so its price. Thus, we expected that, as level of acidity increases market prices of olive oil will decrease. Due to lack of previous empirical studies on this subject, qualitative research (individual depth interviews) was made to generate this hypothesis.

**Hypothesis 2 (a) – Biological olive oil will command higher prices than virgin olive oil (base category).**

**Hypothesis 2 (b) – Mixed olive oil will command higher prices than virgin olive oil (base category).**

Considering prevailing values regarding ecology and taste differentiation, we expected that consumers evaluate more positively biological and mixed (with garlic or sweet herbs, for example) olive oil than virgin (extra, extra-special) olive oil, because they have a great influence on flavour variations and determines cooking functionality. Due to lack of previous empirical studies on this issue, qualitative research (individual depth interviews) was made to generate this hypothesis.

**Hypothesis 3 – Olive oil with producer's brand will command higher prices than olive oil with retailer's brand.**

We expected that consumers do not value olive oils based exclusively on their physical characteristics but also on brand, specially producer's brand rather than retailer's brand. Producer's brand creates a reputation of olive oil in the consumer's mind which is often associated with quality or region of origin. Both brands and regions of origin information are extrinsic cues giving consumers information on probable product performance, also serving to differentiate it from other brands, as well as to help motivate consumers in choosing and purchasing the product, thus making

them satisfied and loyal (JOHANSSON and NEBENZAHL, 1986; BIANCHI, 2001; BLUNDEL, 2002; VRANESEVIC and STANCEC, 2003).

**Hypothesis 4 (a) – Olive oil from region of “Trás-os-Montes e Alto Douro” will command higher prices than olive oil without indication of region (base category).**

**Hypothesis 4 (b) – Olive oil from region of “Beiras and Ribatejo” will command higher prices than olive oil without indication of region (base category).**

**Hypothesis 4 (c) – Olive oil from region of “Alentejo” will command higher prices than olive oil without indication of region (base category).**

Products from certain regions with higher reputation may be preferred to those from regions with lower reputation. These preferences are likely to lead to a willingness to pay more for products from protected designation of origin (PDO) or protected geographical indication (PGI), and this should be reflected in higher selling prices (at least in a highly competitive market) [LOCKSHIN and RHODUS, 1993; SALOLAINEN, 1993; KEOWN and CASEY, 1995; GIL and SANCHEZ, 1997; ANGULO *et al.*, 2000; BIANCHI, 2001; SKURAS and VAKROU, 2002].

#### 4. Methodology

The production of olive oil in Portugal is organised by protected designations of origin (PDO) and other types of olive oil. The PDO can only be used by producers willing to fulfil the required regulations and the place of production is indicated in the label. The other types of olive oil have no geographical indication.

In table II we present the production of olive oil in Portugal by protected designations of origin (PDO).

**Table II – Portuguese Production of Olive Oil from Protected Designations of Origin (1998/2001)**

Protected Cheese Names	Production 1998/1999		Production 1999/2000		Production 2000/2001	
	L	%	L	%	L	%
Moura	680.000	87,4	712.000	91,6	1158.652	72,2
Trás-os-Montes	57.000	7,4	45.000	5,8	350.000	21,8
Beira	-	-	-	-	-	-
Ribatejo	9.150	1,2	20.500	2,6	12.710	0,8
Alentejo	31.500	4,0	-	-	83.568	5,2
Total	777.650	100,0	777.500	100,0	1604.930	100,0

Source: MADRP (2001, 2002, 2003).



We have collected 782 sales price data of olive oil (PDO and others) in a portuguese retailer chain (Pingo Doce), between May and June of 2003. The data collected for each product consisted of price (euro), acidity (degrees), type of olive oil (biological, with plants, virgin), brand (producer or retailer) and designation of origin (Trás-os-Montes e Alto Douro, Beiras e Ribatejo, Alentejo). All the variables other than “Price” and “Acidity” were dummy.

The dependent variable is defined as price (P) per 50 cl (centilitre) and logarithm of price (logP). This measure has been chosen because the weights of most of the sample packages are 50 cl. Independent variables are categorised into three groups. The first category refers to the characteristics of the product, which includes the type of olive oil and the level of acidity. The variables in this categories are:

BIO: dummy variable for biological olive oil

PLANT: dummy variable for olive oil with plants

VIRGIN: dummy variable for virgin olive oil (base category)

ACID: degree of acidity

The second category includes:

BRAND: dummy variable for the type of brand (producer or retailer)

The last one intends to capture the effects of designation of origin. The variables are:

TMAD: dummy variable for olive oil produced in Trás-os-Montes e Alto Douro

BEIRIB: dummy variable for olive oil produced in Ribatejo e Estremadura

ALENT: dummy variable for olive oil produced in Alentejo

REGNO: dummy variable for olive oil without indication of region (base category)

A brief description of data and variables used in the analysis is shown in Table III.

**Table III – Data Description**

Variable	Description	Mean	Std. Dev.
Price	Price of olive oil, in euro, per 50 cl	3,1	1,11
LogPrice		1,06	0,36
Acidity	Degrees	0,58	0,3
Type of olive oil (Dummies)	Biological	0,13	0,34
	Plants	0,20	0,40
	Virgin (base category)	0,67	0,47
Olive oil region of origin (Dummies)	Trás-os-Montes e Alto Douro	0,33	0,47
	Beira e Ribatejo	0,08	0,28
	Alentejo	0,24	0,43
	No region indication (base category)	0,35	0,48
Brand	Producer 1; Retailer 0	0,89	0,31

Notes: N = 782, except acidity where N=731.

## 5. Results

The hypotheses were tested using OLS regression hedonic price functions. We used a linear and a non linear model, since researchers have estimated hedonic price functions in several functional forms: linear, loglinear, polynomial, multinomial (ANGULO *et al.*, 2000; WEEMAES and RIETHMULLER, 2001; SCHAMEL, 2003).

Before testing the hypotheses we analysed the likely extent of multicollinearity in the data by correlating the independent variables. Most of the correlations are quite low and the variable-inflation factor (VIF) is less than 5,3, a threshold value that indicates the presence of multicollinearity (HAIR *et al.*, 1995). Therefore, results from both measures indicate that, although multicollinearity can affect the model, it does not represent a severe problem here. In other words, correlation among exogenous variables is not so high as to prevent a precise analysis of their individual effects.

The estimated parameters can be seen in Table IV. Overall, the model shows good fit with adjusted  $R^2$  values above 0,67 and very significant value of F ( $p < 0,001$ ). Also t-tests indicate that all variables are individually significant.

**Table IV – Estimated hedonic price function (dependent variable P and LogP)**

Variables	Dependent variable P Estimate (t-statistic)	Dependent variable LogP Estimate (t-statistic)
Constant	2,407 (19,112)**	0,753 (19,904)**
ACID	-1,577 (-15,435)**	-0,59 (-19,219)**
BIO	1,567 (18,617)**	0,406 (16,045)**
PLANT	1,842 (19,064)**	0,625 (21,513)**
BRAND	0,729 (5,45)**	0,355 (8,826)**
TMAD	0,599 (6,304)**	0,237 (8,307)**
BEIRIB	0,625 (5,696)**	0,224 (6,801)**
ALENT	0,768 (8,914)**	0,298 (11,501)**
N	782	782
$R^2$ Adjust.	0,673	0,72
F statistic	215,66**	269,08**

Note: (\*) and (\*\*) indicates significance at the 5% and 1% level, respectively.

Hypothesis 1 states that price of olive oil will decrease as the degree of acidity increases. This hypothesis is supported by the data. Therefore, the impact of acidity on price is negative and it would be reasonable to expect a discount (-59% or €-1,899 at the average price). It seems that, in the absence of other quality cues, consumers associate low levels of acidity in olive oil with higher perceptions of quality and so its price.

Hypothesis 2 states that consumers evaluate more positively biological and mixed (with garlic or sweet herbs, for example) olive oil than virgin (extra, extra-special) olive oil. This hypothesis is supported by the data. Variables “BIO” and “PLANT” show significant positive effects on price (+40,6% and +62,5%, respectively), relative to virgin olive oil (base category). Therefore, it seems that natural and more artisan ways of production and additional ingredients improve the perceived value of the olive oil to the consumer. The method of production has a clear impact on the characteristics and quality of olive oil, while additional ingredients enhance olive oil functionality.

Hypothesis 3 states that consumers do not value olive oil based only on their physical characteristics but also on brand, specifically producer’s brand is rather valuable than retailer’s brand. This hypothesis is supported by the data, indicating that place of production or brand reputation are important information for consumers’ decisions. Also, that consumers are willing to pay more money for producer’s brand (+35,5% or €1,1 at the average price) than for retailer’s brand.

Hypothesis 4 (a) (b) and (c) state that olive oil from regions of “Trás-os-Montes e Alto Douro”, “Beiras e Ribatejo” and “Alentejo” will command higher prices than olive oil without indication of region (base category). This hypothesis is supported by the data, indicating that olive oil from regions of “Trás-os-Montes e Alto Douro”, “Beiras e Ribatejo” and “Alentejo”, relative to other olive oil without mention of region (base category), are perceived as more valuable, being consumers disposed to pay a price premium (23,7%, 22,4% and 29,8%, respectively).

These results offer some support to the proposition that, where it is not possible to distinguish objectively between products on the basis of intrinsic quality, consumers will resort to the use of the region of origin cue as a surrogate quality index. The relationships between region of origin, perceived product quality and willingness to pay a price premium were supported by the data.

## **Conclusion**

The current study focused on actual pricing behaviour of portuguese olive oils in a real market setting. The study has shown that designation of origin has a positive and significant impact on the prices of olive oil from the regions of “Trás-os-Montes e Alto Douro” , “Beiras e Ribatejo” and “Alentejo”. Other olive oil attributes that have shown positive effects on price were method of production (biological) and additional ingredients (garlic, sweet herbs), relative to virgin olive oil. Also, producer’s brand seems to increase the market price of olive oil, while an inverse relationship occurs between acidity level and price.

The study also shows that olive oil from protected designations of origin (PDO) is better priced than others without indication of region of origin. Therefore, if the region of origin has a positive image/reputation on the olive oil market, producers from that region should conduct their marketing operations building around the tradition and quality of the product and “linking this image univocally to a certain territory”(BIANCHI, 2001). In this sense, to give more visibility to the region of origin on the label or establishing brand names are appropriate approaches but, to be succeeded in the long run, quality certification must be implemented to prevent free-riders to operate in the market.

The producers from regions with less reputation on olive oil should compete on brand equity and marketing actions (market research, advertising, promotions, public relations) in order to grant an image of typicality for theirs owns products. To reach that, as underlined before, control on the final product and on all phases of the production chain must be proceeded. That means co-operation between producers and/or public support will be needed, either to promote the region of origin and change the attitude of consumers regarding the consumption of the product, either to establish the mentioned control (certification) structures, or to get a certain scale in terms of goods available in the markets channels.

This research has faced several limitations, so the interpretation of the results requires care. First, it is important to recognise that this analysis does not provides information on demand and supply side factors likely to affect price. Second, the data used in the calculations of the model was obtained from only a retailer chain (Pingo Doce) – which could affected the implicit prices of our study. Third, accounting for the nature of the market structures of the food retail proved to be a difficult task in light of the limited data available.

Further research on this subject should consider other regional product types and product categories less studied (such as honey and cheeses), since it is known, from the literature on region and country of origin, that effects and their sizes vary according to products and products category.

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